

## TITLE OF THE INVENTION

[0001] Closure for a Container

## BACKGROUND OF THE INVENTION

[0002] The present invention relates to a closure for a container intended for use with  
5 pharmaceuticals or other products. More particularly, the invention relates to closures having a hinged lid.

[0003] Numerous designs exist within the prior art for container closures. Design  
objectives of manufacturers of container closures include ease of manufacture, adaptability of  
the design for use with multiple existing container designs, ease of use by an end user and low  
10 cost. Ease of use is influenced by factors such as the size of the opening of the closure and ease  
of operation of the closure latch.

[0004] Hinged closures are particularly desirable for use by persons with reduced hand  
strength, as would be typical of someone afflicted with arthritis in their hands. A closure  
having a hinged lid eliminates the need to remove the closure from the container neck. As  
15 closures are typically firmly secured to containers during the packaging process, eliminating the  
need to completely remove the closure can be advantageous.

[0005] Hinged closures having a cap opening which is large relative to the container neck  
opening are particularly desirable, as larger cap openings increase the utility of the closure by  
making it adaptable for use with capsules and other dispensed products having a wider range of  
20 sizes. A lid hinge design consistent with maximizing the cap opening is thus also highly  
desirable. Furthermore, a latch design which holds the hinged lid securely fastened, while also  
allowing the latch to be readily released and the lid opened would also be highly desirable. Still  
further, a closure which is adapted for use with multiple styles of existing container designs  
would be desirable, as such versatility would reduce costs to manufacturers and ultimately to  
25 consumers by reducing the need for new manufacturing tooling. Accordingly, a new hinged  
closure providing a high degree of ease of use, adaptability, ease of manufacturing and low cost  
would be advantageous and desirable.

## BRIEF SUMMARY OF THE INVENTION

[0006] Briefly stated, in a first aspect the invention is a closure for a container comprising a  
30 generally annular skirt including opposed outer and inner surfaces. The skirt further includes: a  
generally planar upper surface and a ledge extending from the inner surface and disposed

proximate the upper surface, the upper surface having a generally circular opening extending therethrough. A generally circular and planar lid at least generally coextensive with the opening is provided, having a top surface and a bottom surface; and a living hinge connecting the upper surface of the skirt and the top surface of the lid and supporting the lid for movement  
5 between a closed position. The upper surface of the skirt and the top surface of the lid are generally coplanar, with the bottom surface of the lid being in engagement with the ledge. In an open position, the lid is pivoted away from the upper surface of the skirt to access the opening. The hinge has a length between the upper surface of the skirt and the top surface of the lid which is substantially coplanar with the upper surface of the skirt and the top surface of  
10 the lid when the lid is in the closed position. A latch extends from the lid and is releaseably engaged with the outer surface of the skirt when the lid is in the closed position.

**[0007]** In a second aspect, the invention is a closure for a container comprising a generally annular skirt including outer and inner annular surfaces. The skirt further includes an upper surface. The outer surface includes a generally linear protrusion and a generally smooth area  
15 adjacent the protrusion on a side of the protrusion opposite from the upper surface. The upper surface has an opening extending therethrough. A generally planar lid is sized to complementarily fit within the opening and is pivotally mounted to the skirt for movement between a closed position which closes the opening and an open position which exposes the opening. A generally L-shaped latch extends from the lid and has a first leg extending  
20 generally radially from the lid over the upper surface of the skirt and a second leg extending generally perpendicularly from the first leg such that the second leg is in facing relationship with the protrusion. The second leg includes a generally linear indent extending radially into the second leg. The protrusion is complementarily received in the indent when the lid is in a closed position to releasably hold the lid in the closed position. The latch is released by  
25 application of force to the second leg to pull the indent out of engagement with the protrusion.

**[0008]** In a third aspect, the invention is a combination container and closure system. The container includes an annular neck defining a container opening defining a first area. The closure includes a generally annular skirt including an outer surface and an inner surface. The skirt further includes an upper surface having a closure opening extending therethrough. The  
30 closure opening defines a second area. The first and second areas are substantially equal in size and shape. A generally planar lid sized to complementarily fit within the closure opening is pivotally mounted to the skirt for movement between a closed position which closes the

opening and an open position which exposes the opening. A latch extends from the lid and is releaseably engaged with the skirt when the lid is in the closed position. An area of the closure opening is at least equal to an area of the container opening.

[0009] In a fourth aspect, the invention is a closure for use with a container. The container  
5 has an annular neck with an outer surface. A raised bead projects radially from the outer surface. The raised bead has a first end and a second end and extends continuously between the first and second ends circumferentially around the neck. A gap between the first and second ends extends over a first arc having a first length. The closure comprises a generally annular skirt including an outer surface and an inner surface. The skirt further includes an upper  
10 surface and a lower surface. The upper surface has an opening extending therethrough. A plurality of retaining members extend radially inwardly from the inner surface. Each of the retaining members is spaced about a circumference of the skirt such that any 180 degree arc of the circumference contains at least one retaining member. Each of the retaining members extends over a second arc having a second length which is greater than the first length. The  
15 closure further comprises a generally planar lid having a top surface and a bottom surface. The lid is sized to complementarily fit within the opening. The lid is pivotally mounted to the skirt by a hinge connecting the upper surface of the skirt and the top surface of the lid for movement between a closed position which closes the opening and an open position which exposes the opening. A latch extends from the lid and is releaseably engaged with the skirt when the lid is  
20 in the closed position. The closure is snapped onto the neck of the container such that the bead is positioned between the retaining members and the upper surface and is retained to the container by an interference between the retaining members and the raised bead. The interference prevents the closure from being removed from the container.

[0010] In yet a fifth aspect, the invention is a combination of a closure and a container. The  
25 combination comprises the container having an annular neck with an outer surface. A raised bead projects radially from the outer surface. The raised bead has a first end and a second end and extends continuously between the first and second ends circumferentially around the neck. A gap between the first and second ends extends over a first arc having a first length. The combination further comprises the closure having a generally annular skirt. The skirt includes  
30 an outer surface, an inner surface, an upper surface and a lower surface. The upper surface has an opening extending therethrough. A plurality of retaining members extend radially inwardly from the inner surface, each of the retaining members being spaced about a circumference of

the skirt such that any 180 degree arc of the circumference contains at least one retaining member. Each of the retaining members extends over a second arc having a second length which is greater than the first length. A generally planar lid having a top surface and a bottom surface is sized to complementarily fit within the opening and is pivotally mounted to the skirt by a hinge. The hinge connects the upper surface of the skirt and the top surface of the lid for movement between a closed position which closes the opening and an open position which exposes the opening. A latch extends from the lid and is releaseably engaged with the skirt when the lid is in the closed position. The closure is snapped onto the neck of the container such that the bead is positioned between the retaining members and the upper surface and is retained to the container by an interference between the retaining members and the raised bead, the interference preventing the closure from being removed from the container.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0011] The following detailed description of the embodiments of the invention will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings embodiments which are presently preferred. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

[0012] In the drawings:

[0013] Fig. 1 is a perspective view of a closure for a container, shown in a closed position, in accordance with a first preferred embodiment of the present invention;

[0014] Fig. 2 is a perspective view of a threaded container suitable for use with the closure of Fig. 1;

[0015] Fig. 3 is a perspective view of the closure of Fig. 1, shown in an open position;

[0016] Fig. 4 is a top plan view of the closure of Fig. 1;

[0017] Fig. 5 is an enlarged cross-sectional view of the closure of Fig. 4, taken along line 5-5 of Fig. 4;

[0018] Fig. 6 is a perspective view of a closure for a container, shown in a closed position, in accordance with a second preferred embodiment of the present invention;

[0019] Fig. 7 is a perspective view of a container having a neck with a raised bead and suitable for use with the closure of Fig. 6;

[0020] Fig. 8 is a perspective view of the closure of Fig. 6, shown in an open position;

[0021] Fig. 9 is a top plan view of the closure of Fig. 6;

[0022] Fig. 10 is a bottom plan view of the closure of Fig. 6;

[0023] Fig. 11 is an enlarged cross sectional view of the closure of Fig. 9, taken along line 11-11 of Fig. 9;

5 [0024] Fig. 12 is a perspective view of a closure for a container, shown in a closed position, in accordance with a third preferred embodiment of the present invention;

[0025] Fig. 13 is a side elevational view of the closure of Fig. 12;

[0026] Fig. 14 is a top plan view of the closure of Fig. 12; and

[0027] Fig. 15 is a side elevational view of the closure of Fig. 12, with a tamper-evident strip removed from a remainder of the closure, and rotated 180 degrees such that an interior surface of the tamper-evident strip is visible.

#### DETAILED DESCRIPTION OF THE INVENTION

[0028] Certain terminology is used in the following description for convenience only and is not limiting. The words "right," "left," "top," and "bottom" designate directions in the drawings to which reference is made. The words "interior" and "exterior" refer to directions towards and away from, respectively, the geometric center of the closure or designated parts thereof. The terminology includes the words above specifically mentioned, derivatives thereof and words of similar meaning.

15 [0029] Referring to the drawings, wherein like numerals are used to indicate like elements throughout, in accordance with the present invention there are shown in Figs. 1-14 three preferred embodiments of a closure for use with a container.

[0030] A first preferred embodiment of the closure 10 is illustrated in Figs. 1-5. The first embodiment closure 10 has a hinged lid 50 which is movable between a closed position 12 (Figs. 1, 4 and 5) and an open position 14 (Fig. 3). The first embodiment closure 10 includes a generally annular skirt 30, having conventional threads 40 and further includes a latch 60 for releasably securing the lid 50 in the closed position 12.

[0031] The closure 10 is suitable for use with a conventional container 20 (Fig. 2), having an annular neck 22 provided with threads 24. The neck 22 defines a neck opening 26 having a neck opening area defined by an inner surface 25 of the neck opening 26.

30 [0032] The annular skirt 30 of the closure 10 includes opposed inner and outer surfaces 38 and 32, respectively. The skirt 30 further includes an upper circumferential rim 48 which defines a generally planar upper surface 42, with a generally circular opening 46 extending

therethrough. The skirt opening 46 has a skirt opening area. The area of the skirt opening 46 is substantially equal to the area of the container neck opening 26. A gap 49 in the circumferential rim is sized to accommodate the latch 60 when the lid 50 is in the closed position 12. The outer surface 32 may be provided with a plurality of finger ribs, shown as vertical lines in Figs. 1 and 3, for enhanced grip ability. The outer surface 32 includes a generally linear indent 34, positioned generally opposite a living hinge 58 (described in detail below herein) connecting the lid 50 to the skirt 30 and in general alignment with the latch 60 when the lid 50 is in the closed position 12. A generally smooth area 36 is provided adjacent the indent 34 on a side of the indent opposite from the upper surface 42. A ledge 44 extends from the inner surface 38, and is preferably disposed proximate the upper surface 42.

**[0033]** The lid 50 is generally circular and is at least generally coextensive with the opening 46. The lid 50 includes a top surface 52 and a bottom surface 54. A seal 56 extends generally perpendicularly from the bottom surface 54, proximate an outer circumference of the lid 50. When the lid 50 is in the closed position 12, the top surface 52 is generally coplanar with the skirt upper surface 42, the bottom surface 54 rests against an upper surface of the ledge 44, and the seal 56 is positioned proximate an inner circumference of the ledge 44. The skirt and the container neck openings, 46 and 26, respectively, are generally equal in size and shape such that the ledge 44 and inner surface 25 of the neck opening 26 are coterminous.

**[0034]** The lid 50 is connected to the skirt 30 by the living hinge 58. The hinge 58 connects the lid top surface 52 with the skirt upper surface 42. In the closed position 12, along a length of the hinge 58, the hinge 58 is substantially coplanar with the skirt upper surface 42 and the lid top surface 52. The length of the hinge 58 subtends an arc "A" along a circumference of the lid 50 in the range of about 15 to 35 degrees, preferably about 20 degrees.

**[0035]** The latch 60 is generally "L"-shaped, having a first leg 62 extending generally radially from the lid 50 and a second leg 64 extending generally perpendicularly from the first leg 62. In the closed position 12, the first leg 62 extends over the skirt upper surface 42, and fits within the gap 49. Further in the closed position 12, the second leg 64 is in facing relationship with the skirt outer surface 32. The second leg 64 includes a generally linear protrusion 66 extending generally radially inward from the second leg 64, such that when the lid 50 is in the closed position 12, the protrusion 66 is complementarily received in the indent 34 to releasably hold the lid 50 in the closed position 12. The latch 60 is released by application of force to the second leg 64 to pull the protrusion 66 out of engagement with the

indent 34. From this disclosure, the artisan will recognize that the protrusion 66 on the second leg 64 could be replaced by an indent, and the indent 34 replaced by a protrusion. Indeed, as described herein below, other embodiments of the present invention employ this alternative arrangement.

5    **[0036]**    The first embodiment closure 10 is preferably fabricated from a thermoplastic material using injection molding techniques well known to those skilled in the art. The entire closure 10, including the skirt 30, lid 50, hinge 58 and latch 60, are all formed as an integral , one piece assembly. From this disclosure, one of ordinary skill in the art would recognize that other conventional materials and fabrication techniques could be substituted. Also based on  
10   this disclosure, the person of ordinary skill in the art would further recognize that the relative proportions of the components illustrated could be varied without departing from the spirit and scope of the invention.

**[0037]**    In use, the closure 10 is installed on the conventional threaded neck container 20 during a packaging process. After purchase, the consumer may proceed to dispense product,  
15   for example pharmaceutical capsules, from the container by applying force to the second leg 64 to pull the protrusion 66 out of engagement with the indent 34, moving the lid 50 to the open position 14. The latch 60 can be opened with relatively low force, making the closure especially well suited for use by persons of limited hand strength. Given the very compact design of the hinge 58, the opening 46 can be made to be substantially the same size as the  
20   bottle neck opening 26, allowing the closure 10 to be used with products having a wide range of sizes.

**[0038]**    With reference now to Figs. 6-11, a second preferred embodiment of the closure 110 is shown. In general, elements of the second embodiment 110 have been assigned reference numerals incremented by 100 from the reference numeral of corresponding elements of the first  
25   embodiment 10. For example, the second embodiment 110 includes a lid 150, corresponding to the lid 50 of the first embodiment 10. For the sake of brevity, only those features of the second embodiment 110 which are substantially different from the corresponding elements of the first embodiment 10 are described in detail herein below.

**[0039]**    The second embodiment closure 110 is intended for use with a second container 120  
30   (Fig. 7), having an annular neck 121 provided with a raised bead 124. The neck 121 has an outer surface 122 and defines a neck opening 123 having a neck opening area. The raised bead 124 has a first end 125 and a second end 126 and extends continuously between the first and

second ends 125, 126 circumferentially around the neck 121. A gap 127 exists between the first and second ends 125, 126. The gap 127 subtends an arcuate portion of the neck 121, the arcuate portion having a first length.

[0040] The second embodiment closure 110 differs from the first embodiment closure 10 primarily in that the closure 110 is provided with a plurality of retaining members 140, located proximate to a lower surface 143 of the skirt 130. The retaining members 140 are provided rather than the threads 40 of the first embodiment closure 10, making the second embodiment closure 110 suitable for use with second container 120. The retaining members 140 extending radially inwardly from the inner surface 138 of the skirt 130. Each retaining member 140 subtends an arcuate portion of the skirt 130, the arcuate portion having a second length which is greater than the first length of the gap 127. Each of the retaining members 140 is spaced about a circumference of the skirt 130 such that any 180 degree arc of the circumference contains at least one retaining member. The closure 110 is snapped onto the neck of the container 120 such that the bead 124 is positioned between the retaining members 140 and the upper surface 142, and is retained to the bottle by interference between the retaining members 140 and the raised bead 124, in a manner well understood by those of ordinary skill in the art. The interference thus prevents the closure 110 from being removed from the bottle 120.

[0041] The second embodiment 110 further differs from the first embodiment 10 in that, as discussed above, the relative locations of the mating indent 34 and protrusion 66 are switched. That is, in the second embodiment 110, a protrusion 134 is located on the skirt 130 and an indent 166 is located on the latch 60.

[0042] The second embodiment closure 110 is preferably manufactured using the same materials and processes used to manufacture the first embodiment closure 10, as discussed above.

[0043] In use, the second embodiment closure 110 operates generally similarly to the first embodiment closure 10 and thus provides a closure having a latch 160 that can be opened with relatively low force and a hinge 158 with a very compact design, allowing an opening 146 to be substantially the same size and shape as the bottle neck opening 123. Additionally, since the first embodiment 10 can be used with conventional threaded neck containers and the second embodiment 110 can be used with conventional containers having necks with raised beads, the present invention discloses a closure suitable for use with multiple types of known containers.



[0044] With reference now to Figs. 12-14, a third preferred embodiment of the closure 210 is shown. Similarly to the second embodiment 110, elements of the third embodiment 210 have generally been assigned reference numerals incremented by 200 from the reference numeral of corresponding elements of the first embodiment 10. Again, for the sake of brevity, only those  
5 features of the third embodiment 210 which are substantially different from the corresponding elements of the first and second embodiments 10, 110 are described in detail herein below.

[0045] The third embodiment 210 is preferably used with a container such as the second container 120, and thus preferably is provided with retaining members (not illustrated) such as the retaining members 140 of the second embodiment. The third embodiment 210 includes a  
10 tamper-evident member 280. The tamper-evident member 280 is removably attached to the skirt outer surface 232 by frangible members 282. Finger tabs 284 are provided to facilitate removal of the tamper evident member 280. The tamper-evident member 280 is positioned adjacent the protrusion 234 so as to block access to the second leg 264 of the latch 260 when the lid 250 is in the closed position 212. With reference to Fig. 15, the latch 260 preferably  
15 includes a protrusion 262 which engages with a corresponding indentation 286, located on an interior surface of the tamper-evident member 280, when the lid 250 is in the closed position 212. Engagement of the latch protrusion 262 and tamper-evident member indentation 286 aids in preventing the latch 260 from being opened without the tamper-evident member being removed from the third embodiment closure 210. In use, a consumer removes the tamper-  
20 evident member 280 after purchase of container and prior to opening the lid 250. With the tamper-evident member 280 in place, application of a force to pull the second leg 264 of the latch 260 out of engagement with the protrusion 234 is difficult. Thus the tamper-evident member 280 attached to the skirt 230 indicates that the lid 250 has not been opened since being sealed at time of manufacture.

[0046] Alternatively, the tamper-evident member 280 could be used with the first  
25 embodiment closure 10. In this case, if no other tamper-evident features were included, the first embodiment closure 10 having a tamper-evident strip could simply be unscrewed from the container 20, thus defeating the tamper-evident function. Therefore, if the tamper-evident member 280 were to be used with the first embodiment closure 10, it would be necessary to  
30 further provide an additional element for indicating if the closure 10 had been unscrewed from the bottle 20.

[0047] The third embodiment closure 210 is preferably manufactured using the same materials and processes used to manufacture the first and second embodiments 10 and 110. Furthermore, the third embodiment closure 210 operates in a manner generally similar to the first and second embodiments 10, 110, with the added step that a user must remove the tamper-evident member 280 prior to use. Thus, the third embodiment 210 provides the same benefits as those provided by the first and second embodiments, as well as the added benefit of providing the user with added assurance that if the tamper-evident member 280 is in place, then the closure has not been opened subsequent to the packaging process.

[0048] A closure for a container is thus disclosed including a skirt, a lid, a living hinge and a latch. The lid has an upper surface which is substantially coplanar with the living hinge and an upper surface of the skirt. The closure has an opening having an area which is substantially equal to the area of an opening of the container. The closure may be adapted for use with various types of existing container neck designs. The closure, including the skirt, lid, hinge and latch, is formed as an integral, one piece assembly. The closures disclosed are adaptable to multiple known container neck designs and provide exceptional ease of use by the consumer. The closures are readily and inexpensively manufactured.

[0049] It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention.